

## Industry Meets School

### Working in the Plastics Industry Is Exciting



**L**earning By Doing – The research team weighs a plastic granule on the integrated scale of a microwave dryer. The members of the technology team are huddling over a table with drying data to determine whether the granule is ready to be processed. The design team makes color decisions after determining the available colors by working with the technology and the research team. Meanwhile, the communications team is busy documenting the daylong production process. All of this is not taking place, as one might think, at a plastic processing facility but at Baylab plastics in Leverkusen, Germany.

Since January 2007, more than 5,000 students and 400 teachers have participated in the one-day live project “Plastics lab for all the senses” of Bayer MaterialScience (BMS). At the lab, the students are involved in the production process from the idea to the finished product, which can range from a housing of a computer mouse to plastic spoons in vibrant colors. With the student laboratory, the plastics producer is responding to a complex and wide-ranging problem, which can be summarized as a lack of interest in science and technology.

#### Notorious Lack of Trained Professionals

However, the trend should be going in the opposite direction. In recent years, both the



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▲ 9th graders produce a computer mouse at Baylab plastics.

“The students learn what creative minds can achieve through teamwork, and how important individual commitment is for overall success.”▶

governments of many EU Member States and the EU Commission have announced ambitious plans for Europe’s future as a knowledge and technology leader in order to secure Europe’s future in the global market in the long term. However, a massive obstacle is hampering the realization of these plans: the European-wide lack of trained professionals. With the increasing over-ageing of European societies and the dwindling interest of young generations in science and technology, this situation will become more severe, according to a position paper by the European Federation of National Engineering Associations (FEANI). Individual EU Member States have also raised red flags. The Association of German Engineers (VDI), for example, estimated in its first representative engineering study that 15,000 engineers are lacking in Germany.

Finding a way out of this crisis is not only up to education politics but industry must also become active. A number of international chemical corporations, such as Bayer, have taken up education as part of their corporate social responsibility. Dr. Wolfgang Plischke, the Bayer board member responsible for innovation, technology,



and environment, views a good education an investment in the future opportunities for young people. “As a research-oriented company,” Plischke says, “we permanently depend on new scientific talent. This is why in our support we currently target innovative projects that convey the importance and fascination of sciences.”

### Student Labs Complement Classroom Teaching

One of these projects is Baylab plastics of BMS, one of the world’s largest producers of polymers and high-performance plastics. At the lab, students of 14 years and older gain insight into the daily research and production work at a chemical company. Unlike most other student labs in Germany, of which more than 230 were founded since 1996 as an alternative to the highly theoretical classroom teaching in sciences, Baylab plastics goes beyond basic research. The students decide which of the five teams contributing to the development and production of a sellable

product they want to join. The choices are technology, research, design, communications, and, depending on the educational level of the students, also a financial team. The students are directly involved in the entire process. Under supervision they operate an injection-molding machine, which the KraussMaffei machinery manufacturer has made available to the lab at no charge.

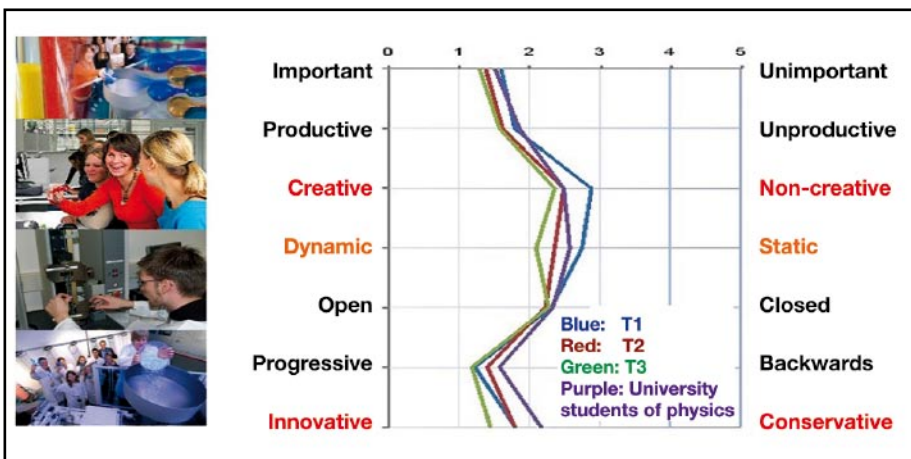
### Experiencing the Plastics Industry First Hand

“The day at Baylab plastics is an eye-opener in two ways,” says Karl-Heinz Wagner, the head of the student laboratory. “On one hand, the production process becomes transparent: What are the polymer materials and what can be produced with them? On the other hand, the students get an idea how many different professions are involved in the making of a product. At the end of the day, the students not only go home with a product that they have made but also with a more differentiated idea what a plastics manufacturer does.” The student lab has yet another important effect: the students learn what creative minds can achieve through teamwork, and how important individual commitment is for overall success.

The positive effects of the one-day visit at the student lab are currently studied by the Leibniz Institute for Science Education (IPN) at the University of Kiel, Germany. According to the preliminary results of the study, the student labs have positive effects in three different areas.

### The Triple Positive Effect of Student Labs

Student labs foster the interest in science and technology. Even the one-day visit at Baylab plastics fundamentally alters the



Change in student attitude towards physics due to lab visit and project work at Baylab plastics (T1 – before the visit, T2 – immediately after the visit, T3 – about 8 weeks later; the purple curve the attitudes of university students of physics).

stereotype and the indifferent student attitude towards research and technology (Fig. 1). As a result of a day at Baylab plastics, there is especially a strong shift towards the positive in the perception of science and technology as creative and innovative fields. The effect of this may last after the lab visit and become an element in the student's career choice.

For many students a career in science and technology is hardly attractive because of the negative way students experience science and technology in school. Too many times the monotonous ploughing through the curriculum is done at the expense of focusing on the elements that are crucial for professions in research, development, and technology, namely curiosity, originality and creativity. The reason for this neglect is often simply a lack of time and equipment. Hands-on science and technology, as it is practiced at the student labs, changes the students' attitude. The world of plastics comes to life and can be experienced first hand at Baylab plastics – in such a tangible manner that in the survey at the end of the lab day, some students say that they want to reconsider their study or career choice.

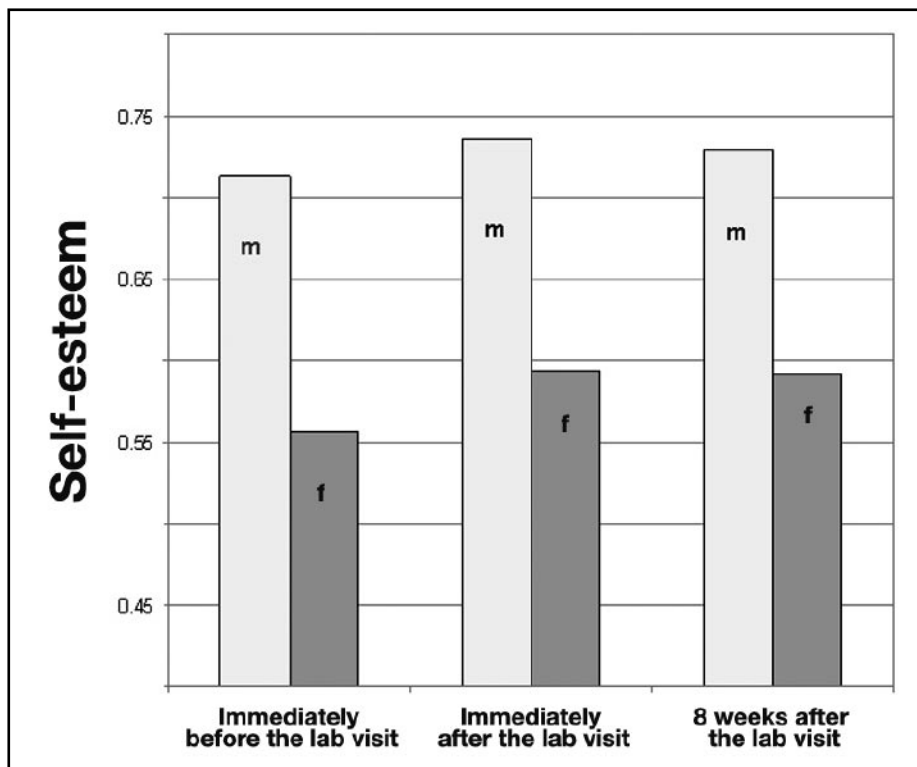
### Overcoming the Gender Gap

Even in the well-known phenomenon of male dominance in scientific and technical professions, the student labs are breaking old patterns. According to the IPN study, girls in particular benefit from the student lab experience, and their self-esteem in the field noticeably increases. The gender gap still exists but it is narrowing.

The third positive effect of student labs is the successful involvement of problem groups and underachievers who contribute minimally in a classroom setting, for example adolescents with learning and motivational difficulties. Teachers who, in compliance with the Baylab plastics concept, accompany their students but do not interfere during the day, often observe that weak students show surprising talents, commitment and liveliness.

### A Project with Wide-Ranging Repercussions

Baylab plastics is open to student groups from all school types, ages 14 and up, as well as students as part of their career orientation, trainees in scientific, technical and business professions, participants in chemical Olympics, highly gifted student programs and national competitions. The visit at the lab is also a valuable experience for science teacher on-the-job training, teacher trainees, students from universities and technical universities, students working on their degrees and Ph.D. candidates as well as employees in technical or team coaching programs.



Change in the self-esteem of scientific abilities of girls and boys at different points in time before and after the lab visit.

The student groups come from different parts of Germany and the demand is so overwhelming that the operator of Baylab plastics only admits one student group per school and school year to give as many schools as possible the opportunity to visit the lab. It is no surprise that intensive discussions are currently taking place to create additional facilities following the same educational concept – initially in Germany, and later in other European countries. That there is strong interest was demonstrated by the visitor group with the longest travel so far: school students from Denmark.



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Working on projects hands-on is the key to success at Baylab plastics in Leverkusen, Germany.



